

THURSDAY, OCTOBER 24, 1901.

LIFE BY THE SEA-SHORE.

Life by the Sea-shore: an Introduction to Natural History. By Marion Newbigin, D.Sc., &c. Pp. viii + 344. (London: Swan Sonnenschein and Co., Ltd., 1901.) Price 3s. 6d. net.

MANY of the people who now live on the coast, or periodically migrate for a few weeks to the sea-side, must have often felt the need of just such a book as the one before us. It is suited to the junior student or the amateur who as yet knows little or nothing of marine life; it is moderate in size and price, and contains a wonderful amount of information; it is almost as refreshing as a dip in the briny itself, and in the treatment of its subject-matter it reminds us of Charles Kingsley's "Glaucus" and of Philip Gosse's "Year at the Shore," and other charming works of a former generation. We in Britain are a maritime people, we owe much to the sea, and we boast on all appropriate occasions of our connection with it. Surely, then, we ought all of us to have some elementary knowledge of oceanography—of our seas and their ways and their inhabitants. British naturalists in the past have done much to enrich marine zoology by splendid monographs, such as those of the Ray Society and some of Van Voorst's series; but the public at the sea-side cannot be expected to read monographs—or to understand them if they did—and the volumes of Gosse are out of print, and moreover are somewhat antiquated both in nomenclature and science.

The present little book by Dr. Marion Newbigin is quite up to date, and although scientifically accurate and sound is so delightfully simple that it can be read and comprehended by anyone at the sea-side who can collect common shore animals and compare them with the printed pages. It is food for babes compared with the monographs, but is at the same time sufficiently nourishing and stimulating to lead to the healthy development of sturdy young marine zoologists. Judging from the results I have had with some average school-girls of fifteen to eighteen upon whom it has been tried during the last few weeks, I should expect that this book will give rise to many delightful collecting expeditions, and after-hours full of intellectual pleasure when observing and identifying the specimens and reading up and verifying their characteristics. It is satisfactory, by the way, to see that Miss Newbigin insists upon the educational value of a certain amount of collecting and of species work—"and the identifying of species, though now sadly out of fashion, is an occupation which may yield one of the subtlest of pleasures." "So much of the present-day academical teaching seems to have [a certain] result, that I cannot but urge anyone beginning open-air studies to find some time for species work, and for this habits of patient and minute observation are essential," &c. (p. 25).

Our author is already known to zoologists from her papers on the pigments of Crustacea and other animals and her little book on "Colour in Nature." The present book, she tells us, is based upon a course of lectures—

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given presumably to Edinburgh students, as most of the animals dealt with, or chosen as types, are common east coast forms, and as a result one occasionally comes upon a remark that does not apply to other parts of our sea.

After a couple of introductory chapters on the conditions of shore life and the general characteristics of shore animals, such as shells, burrowing, weapons, partnerships, masking, larval characters, classification, hints as to methods, and so on, Chapter iii. starts with sponges and goes on to zoophytes. Then sea-anemones, worms, echinoderms, crustacea, molluscs, fishes and ascidians occupy the next twelve chapters, after which is a final section on the distribution and relations of shore animals, a list of works of reference and a double index. On the whole, perhaps the section on the higher Crustacea is the most full and satisfactory. The crabs seem especially well done, and also the polychaetes. More space than the passing reference on p. 27 should have been given to the Protozoa. It is useless to pretend that the subject-matter of this book can be worked through without the microscope, and if that instrument is required for the triradiate spicules of the calcareous sponge, why should it not be applied to show us *Noctiluca* and *Ceratium* and *Rotalia* and *Folliculina* or some other equally common and important shore Protozoa? A short section on a few of the more abundant diatoms also would be justified by their great importance in connection with the food of animals in the sea, and ultimately of man.

One would rather not make any critical remarks—but few are needed—and if certain points are now noted which may seem to detract to some extent from the value of the book, they are not put forward in any fault-finding spirit, but are to be regarded rather as suggestions which may be of use to the author when a second edition is called for. There is a certain want of proportion in the amount of space allotted to different groups. For example, we find more than twenty pages, and a dozen figures, on the hydroid zoophytes, and less than twenty lines (no figures) on the Polyzoa, which are so constantly associated with the hydroids in shore pools and on seaweeds such as *Fucus* and *Laminaria*. It is difficult to see any reason for this and a few other cases of arbitrary selection. The two groups occur together, the Polyzoa are usually the more abundant and striking, the same methods of collecting and examining apply—the pocket lens will show a certain amount of the structure of the colony in each case, but a microscope is really necessary for both. And as to the aesthetic pleasures derived from beauty and charm of movement, I find that the commonest of shore Polyzoa—such as *Flustrella hispida*, found all round our coasts, in profusion, on *Fucus*—alive in a watch-glass of sea-water under even a low power of the microscope, protruding and retracting its crown of ciliated tentacles, is one of the most fascinating objects that can be shown to, or found by, the young naturalist on the sea-shore, and one of the most easily obtainable from which to demonstrate ciliary action and to give as an example of an animal collecting food by causing currents in the water.

I have alluded to the inadequate treatment of Protozoa. A more serious omission even is that of the Copepoda, a group of great importance amongst marine animals on account both of its numerical strength and of

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the activity and utility of its members. It is true that very many of these are obtained from the surface of the sea and not strictly from the shore, but that same remark applies equally to the medusoids discussed and figured in Chapter iii., and it would be difficult to catch the medusoids without seeing Copepoda also. But there are also plenty of shore-haunting copepods to be obtained very easily with a muslin hand-net in pools, or from sand and mud at low tide, and under stones. A small boy of six has just brought me a cup full of bright red ones (*Harpacticus fulvus*) which he caught himself with a sixpenny hand-net along the edge of the sea and in pools, where they are quite visible to the eye. He wanted to know what they were and how they jumped, and his little sister of two-and-a-half added the important question, "Why are they so red?" If Miss Newbiggin would answer these questions—and no one is more competent than she to deal with the last one—it would help not only the children, but their seniors. *Harpacticus* is sometimes very abundant in pools far up the shore, where their red bodies are quite conspicuous on the green *Enteromorpha*, and they are eaten with avidity by young blennies, sticklebacks and other little shore fishes. "Why are they so red?"¹

The "keys for identification" and other similar tables of characters at the ends of chapters are of doubtful utility. They are, of course, incomplete; they only deal with a few selected genera and species in each section, and yet from their form they give the deceptive impression of a complete classification; they lead to a good deal of repetition and give little information beyond what is in the text—a considerable saving of space would be effected by their removal. What is the difference between "legs very slender and long" given as a character of *Phoxichilidium*, and "legs very long and slender" as a character of *Nymphon* in the table on p. 224?

Dissection of the types chosen and details of internal structure have, probably quite wisely, been avoided; but under those circumstances some statements in the book, such as that "the heart is in front of the gill" (p. 248) given as a character of the opisthobranchs, will probably be found meaningless to readers without further knowledge than the book gives. Even one simple anatomical diagram of the type form of each group would have been a useful addition.

There are, of course, other points of detail in connection with which alterations might be suggested. *Asterina gibbosa*, very common in shore pools amongst *Corallina* on some parts of the coast, might be added to the starfishes discussed. The presence of thread-cells in the cerata of *Eolis* is an interesting point worthy of mention. *Trochus zizyphinus* (p. 236) is not merely an inhabitant of deep water, but is common, alive, between tide-marks on some of our shores. On the whole the figures are good, but *Alcyonium* (p. 16), *Polycarpa* (p. 295) and *Pleurobrachia* (p. 330) are not satisfactory.

The style of the book is easy and pleasing—lively even in places, as on p. 277, where the author describes how she first made acquaintance with the grace and beauty of the living *Lima hians* when released from its woven nest of shells and weeds. In conclusion, it is a pleasure to

¹ Obviously, there are two kinds of answer—the one in terms of lipochromes and the other in terms of natural selection.

cordially recommend "Life by the Sea-shore" as a charming and useful holiday companion which will not only give much information, but will also serve as a good introduction to one of the most fascinating branches of modern science.

W. A. HERDMAN.

SCIENTIFIC TOPOGRAPHY.

Recherches sur les instruments, les méthodes et le dessin Topographiques. By Colonel A. Laussedat. Tome ii. Parti. Pp. 198. (Paris: Gauthier-Villars et Fils, 1901.)

In the first part of the second volume of his exhaustive treatise on topography, Colonel Laussedat treats of "iconométrie" and "métrophotographie"—two branches of the art which are but little studied in British military schools. He commences by tracing the evolution of the photo-theodolite from the primitive forms of the camera obscura and the camera lucida; and not the least instructive part of this volume is to be found in the careful analysis of those principles of perspective which are the governing principles of all methods of reducing a field of observation to its horizontal plan, whether for the purpose of topography or of plan drawing. He shows that the camera lucida is an instrument which (in France at any rate) has proved of immense value in the hands of the military engineer. Some excellent examples are given by Colonel Laussedat of the practical use that has been made of this instrument in the construction of accurate geometrical views of fortifications, with the object of obtaining precise plans of the same, on the principle which was first advocated by Beaumont-Beaupré, and which is fully explained by the author. It is curious that an English invention (it was invented in 1804 by Wollaston) should have been applied to so much greater practical purpose in France than it ever has been in England.

From camera lucida drawings of the elevation of a line of fortifications, or of buildings taken from two or more points of view, French engineers have found it possible to construct accurate plans of the same fortifications on precisely the same principles which now lead to the definition of topography from photographs. With this instrument, combined with a telescopic enlargement of the field of view, the defenders of Paris during the last memorable siege were able to construct a fairly accurate panorama of the German advanced positions around the city, to note the daily and hourly changes in those positions, and to keep the military authorities perpetually supplied with most important information which would otherwise have been impossible to attain. In his concluding chapter Colonel Laussedat renders a well-deserved tribute of recognition to those many assistants (astronomers, doctors, engineers, artists and architects) who all brought the necessary technical artistic skill to his assistance and maintained that remarkable record. In England the camera lucida is still recognised as an important aid to the illustration of geological phenomena. But its capabilities as a military instrument have been hardly recognised.

From the camera lucida to the photo-theodolite is a natural process of evolution, and the best half of the volume is devoted to its illustration. The application of photography to surveying has already been well tested